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Service and Methods Demonstration Program

SUMMARY AND PROGRAM OVERVIEW

NOVEMBER 1975

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16. Abstract

This document summarizes the Service and Methods Demonstration Program Annual Report. SMD projects are described as they relate to the program objectives of: (1) decreased transit travel time, (2) increased transit reliability, (3) increased transit coverage, (4) increased transit vehicle productivity, and (5) improved mobility of transit dependents. Projects undertaken to date (FY75) are discussed followed by new approaches planned for FY76.

Independent activities carried out in support of the demonstration are also summarized here, such as the development of evaluation guidelines and improved methodologies for demonstration evaluation, analytical studies in support of the development of experimental demonstrations, and case studies of independent local innovations. Information dissemination mechanisms and activities designed to facilitate more widespread knowledge of effective approaches to improving transit are discussed.

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DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION
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THE ADMINISTRATOR

Through its Service and Methods Demonstration Program, the Urban Mass Transportation Administration (UMTA) provides a continuing source of information on promising innovations that decrease transit travel time, increase transit reliability and coverage, increase transit vehicle productivity, and improve the mobility of the transportation disadvantaged. Many projects are also good examples of transportation system management as called for in our planning regulations.

A summary of the information contained in the first annual report is enclosed. It is our intention to continue reporting demonstration program results annually so that local areas might benefit from the experience being gained. In addition, future reports will not only contain results from the projects directly sponsored in the program, but will also document a number of relevant innovations entirely locally sponsored. Your help in bringing these latter opportunities to our attention will be appreciated.

The full annual report may be ordered under PB #251325 from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal, Springfield, Virginia 22151 for $8.00.

Sincerely,

Robert E. Patricelli

Robert E. Patricelli

Enclosure

PREFACE

This document is a summary of the 1975 Service and Methods Demonstration Program Annual Report, prepared by the Office of Systems Research and Analysis of the Transportation Systems Center and the Service and Methods Demonstration Program Staff. The annual report is one of the work items undertaken as part of the support to the Service and Methods Demonstration (SMD) Program sponsored by the Office of Transit Planning, Urban Mass Transportation Administration. It contains a description of all transit demonstration projects and support activities carried out under the SMD program.

The material summarized here was compiled and prepared under the direction of the UMTA Program Manager, Ronald Fisher, and TSC Project Manager, Peter Benjamin. Structure, content, and editing were the responsibilities of Donald Kendall. The following TSC staff members participated in the preparation of the report: Robert Casey, Carla Heaton, Joseph Misner, Robert Waksman, Charles Cofield, Howard Simkowitz, Leonard Bronitsky, Sam Schiff, Willa Michener, Mary Stearns, Mary Jenkins, and Jan Lanza. Research and editorial assistance were provided by staff of Raytheon Service Co., including Fred Hafer, Stanley Moss, Judith Ceremsak, Herbert Bogen, Robert Park, and Nancy Cooney.

SUMMARY AND PROGRAM OVERVIEW

The Service and Methods Demonstration Program (SMD) is essentially the current expression of the techniques and methods category (as opposed to hardware development) of the Urban Mass Transportation Administration's demonstration activity. The authority to conduct demonstrations to improve "facilities, equipment, techniques and methods" was the first authority granted by Congress in initiating a Federal Government role in mass transportation in 1961. However, it was just recently (fiscal 1975) that the program began to take on a more activist posture in carrying out this authority. In prior years, it was relatively unstructured and responsive to random applications from local governments. These were not very useful in developing generalized concepts of national interest.

The basic premise of the Service and Methods Demonstration activity is that much better performance of existing urban transportation systems can be attained through the imaginative use of traffic management and marketing techniques, pricing, transit service variations and state-of-the-art technology. The program has very high pay-off potential with respect to improving the quality of transit service, which is a precondition for effective support of other prominent national objectives such as improved air quality and energy conservation.

A prime consideration in attempting to increase the effectiveness of our total demonstration effort has been to identify objectives which would be clearly attainable by virtue of actions taken as part of the demonstrations, independent of exogenous conditions.

The following objectives were chosen to categorize projects for program planning purposes on the basis of their being operational, technically credible, and supportive of meeting the transit problems cited above.

- Reduce travel time by transit.
  This is an important factor in increasing transit ridership and improving vehicle productivity.

- Increase the area coverage of transit service.
  This is important for increasing transit ridership, yet responding with cost effective approaches to public pressure for new transit service in our lower density suburban and non-urbanized areas.

- Improve the reliability of transit service.
  This is one of the most important factors in maintaining and increasing ridership.

- Increase the productivity of transit vehicles.
  This is most important in the continuing struggle to reduce operating deficits while maintaining or improving service.

- Improve the mobility of transit dependents.
  The development of promising techniques to achieve this is necessary to respond to increased pressure to provide mobility to people without automobiles.

Projects to accomplish the above objectives are categorized into two stages: experimental demonstrations which are intended to develop and test concepts to the point when they merit widespread use; and exemplary demonstrations which are intended to take these and other relatively proven concepts and apply them to projects in other cities that will continue the projects beyond the period of Federal funding thus gaining further exposure to the merit of these innovations.

CONTENT AND STRUCTURE OF THE ANNUAL REPORT

The Summary and Program Overview reviews past efforts related to the current objectives of the program and specific plans for fiscal 1976. Chapter II is a background section describing the evolution of the program, past problems and the current structure.

The succeeding chapters contain a description of all demonstrations and activities being carried out under the SMD progrm. Results of the demonstrations are summarized and compared to permit an overall understanding of what has been learned about the applicability and effectiveness of various techniques for improving the quality of public transit. Discussions of exemplary and experimental demonstrations are organized according to the program objectives to which they are related. The techniques used to meet the objectives, such as bus priorities or demand responsive service, are described prior to discussion of their application within a particular demonstration.

Chapter III describes those demonstrations aimed at improving transit service by meeting three service oriented objectives: decreased travel time, increased coverage, and improved reliability. Chapter IV deals with the objective of increasing the productivity of transit vehicles and describes the various measures of productivity as well as demonstrations aimed at improving productivity. Demonstrations of methods for improving service for the transit dependent, with emphasis on the elderly and handicapped, are described in Chapter V.

Chapter VI discusses a variety of independent activities underway in support of the program. For example, there are analytical studies in support of the development of experimental demonstrations and case studies of independent local innovations. These improve the knowledge base of the program. Case studies which will be reported *in interim* and future annual reports will be a valuable supplement to the flow of information from the Service and Methods Demonstration Program to all urban areas.

The Appendix contains a detailed description of each of the current demonstrations, including those about to begin operation, those presently underway, and those that are already completed and evaluated. Each demonstration is described separately with the following information provided:

(1) Project Overview
(2) Objectives
(3) Project Description
(4) Project History and Status
(5) Results
(6) Evaluation and Conclusions
(7) References

DEMONSTRATION ACCOMPLISHMENTS THROUGH FY 1975

This review is confined basically to completed and currently active projects. However, some projects which began in fiscal year 1975 are discussed in the section on FY 1976 plans, in order to facilitate understanding of the evolution of the program.

Reduce Travel Time, Increase Coverage, Improve Reliability

Three of the program objectives, those relating to travel time reductions, increased coverage, and improved reliability, together reflect an attempt to enhance the overall level of transit service available to the public. Thus many of the demonstrations undertaken in the Service and Methods Demonstration Program are aimed at meeting these three objectives simultaneously.

Some of the earliest demonstrations sponsored by the Federal Government were express bus operations, which led to the firm establishment of such commuter services in St. Louis, Nashville, Baltimore, Chicago, Dallas, Louisville, Boston, and many other cities. Park-and-ride, as well as traffic management techniques, have been applied in conjunction with express bus service.

Stemming from these earlier express bus operations, more comprehensive demonstrations have evolved addressing the problem of peak hour congestion and people movement in heavily trafficked urban corridors. These demonstrations have involved the close cooperation of the FHWA and UMTA at the Federal level; transit operators, traffic engineers, highway engineers and planners at the local level. Two outstanding experimental successes are now operating completely under local sponsorship: the Shirley Highway Express Bus-on-Freeway Project, Northern Virginia, and the contraflow bus lane approaching the Lincoln Tunnel in Northern New Jersey. A third project, the "Blue Streak" express bus service was initiated in Seattle, Washington, after two referendum defeats of a proposed rail transit system. This demonstration provided a model for an area wide express bus system that was approved in a third referendum.

An exclusive bus lane was constructed in the median of the *Shirley Highway*, connecting employment centers in Washington, D.C. and Virginia with suburban areas in Virginia. Ninety new buses were purchased for the demonstration project, park-and-ride facilities for 800 cars were provided, and over 50 square miles were added to the service area. On-time performance was raised to 90 percent, a 20 percent reliability increase, and travel time savings averaging 17 minutes were achieved. Nearly 12,000 new transit riders were attracted to the service, removing 7,250 autos from the peak period traffic flow. Over 40 percent of the CBD-bound commuters in the corridor now use buses.

The *Lincoln Tunnel Approach*, a 2.5 mile reserved contra-flow bus lane leading to the Lincoln Tunnel along an expressway in New Jersey, handles up to 500 buses per hour. Riders are currently saving between 8 and 25 minutes on their trip, and 95 percent have reported increased reliability in travel times.

Experimental projects in Miami, Minneapolis-St. Paul, and Los Angeles are currently testing other techniques. In *Miami*, park-and-ride and express bus services have been augmented by a reserved lane operation and by giving buses priority at traffic signals along their route. This has resulted in bus speeds very nearly approaching the arterial speed limit. The improved service has doubled ridership. The results from this service will be compared to the implementation of a

reserved bus and carpool lane on a parallel freeway in early 1976. The complex and multifaceted effort will permit a systematic evaluation of alternative bus priority strategies.

In *Minneapolis-St. Paul*, the technique used is ramp metering and central monitoring for a freeway to allow buses free access while auto access is metered, depending upon traffic flow conditions. This has permitted a significant expansion of transit service, resulting in a tripling of ridership on the express buses. A majority of the ridership increase comprises former auto users. Many riders who were diverted from local bus routes have saved travel time, and some local service has been eliminated due to overlap with new express services.

In *Los Angeles*, the median lanes of the Santa Monica Freeway will be reserved for buses and carpools, in both directions, 24 hours per day, over a distance of twelve miles in the spring of 1976. It will be the first time a freeway lane in the direction of traffic flow has been set aside for buses and carpools without a physical barrier. The feasibility of this operating concept, being attempted on the busiest freeway in the world, will be evaluated in terms of safety, public response, and cost. Results of this demonstration will be compared with a similar locally sponsored effort in *Marin County* where both with-flow and contra-flow bus-only lanes extend north along U.S. 101 from the Golden Gate Bridge.

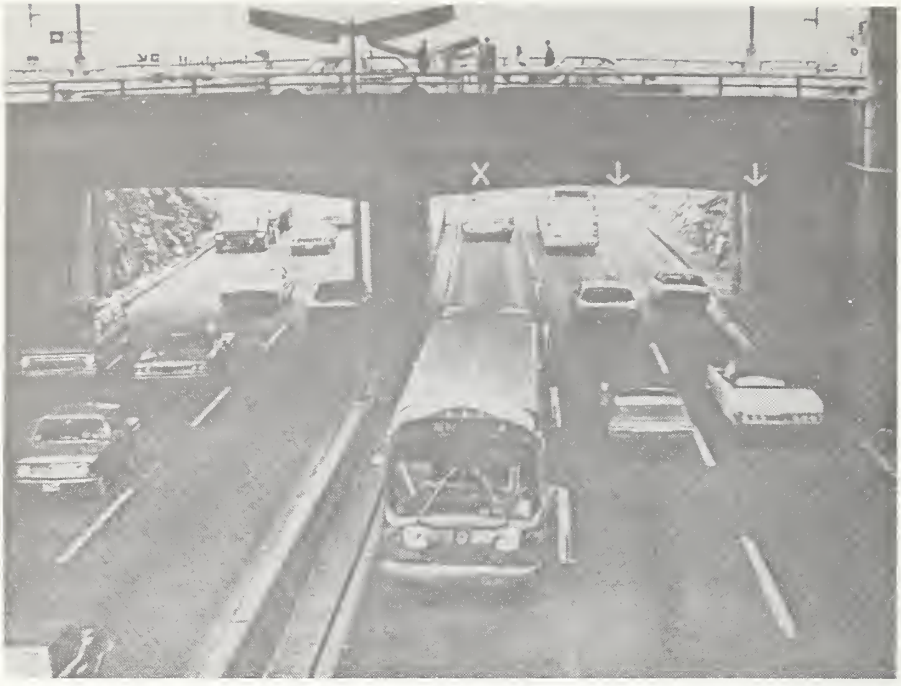
Building on the success of these experimental traffic management projects, UMTA plans to work closely in the coming year with urban areas not currently active in the adoption of such proven transit service models. There are approximately eighty urbanized areas that are potential candidates for these innovations but only about a dozen of them are now actively involved in their adoption. In radial corridors where these techniques are used, it seems reasonable to expect to capture 50 percent of the person-trip commutation market. These service models made credible the requirement in guidelines for the new Section 5 capital and operating assistance program, that the efficiency of transit systems be improved by employing techniques to give transit priority in the traffic stream.

Another early project aimed at these service improvement objectives, and which produced favorable results, was a subscription bus service to a suburban work location in *Peoria, Illinois*. Although the bus service was competing with unlimited free parking provided by employers, and there was no traffic congestion, the premium fare subscription service attracted a large number of riders and met operating costs out of the fare box. After the demonstration ended, rising labor costs of the entire system drove the local operator out of business, but indications are that modest support could have resulted in the continuation of a highly popular service. The project showed that commuters can be attracted to high quality personalized transit service. This model has application in various forms in many urbanized areas.

More recent attempts to provide improved transit service in the suburbs have focused on the use of demand-responsive transit integrated with fixed route service. Perhaps the most comprehensive effort underway to develop this integrated service concept is the one being sponsored in *Rochester, N.Y.*, an urbanized area of approximately 600,000 population. Though responsive to all of the program's objectives, it is primarily aimed at developing a cost-effective strategy to increase area coverage and reduce trip time. A dial-a-ride operation is being implemented to provide demand-responsive circulation service in suburban areas, as well as feeding and coordinating with fixed route buses. Subscription buses provide service to employment centers and meet express commuter buses. The expanded coverage, coordinated transfer, and door-to-door services have resulted in steadily increasing ridership, now at 250 percent of the level obtained when the services were first introduced.

Exclusive Bus and Carpool Lanes, Shirley Highway Busway, Washington, D.C.

Cars Waiting at Metered Expressway Ramp, I-35W, Minneapolis, Minnesota; Far Left Lane is a Bypass Lane for Buses.



Contraflow Bus Lane, Approach to Lincoln Tunnel, I-495, New Jersey. Directional Signals on Overpasses Show Operating Status of Lanes.

Low Fare Downtown Circulation Service, "Downtowner" Midibus, Washington, D.C.

The dial-a-ride service will be substituted for lightly patronized fixed-route service in an attempt to increase the efficient utilization of resources. Introduction of computerized routing and scheduling of demand-responsive vehicles, together with direct digital communications from the computer to the buses are also expected to improve productivity. Another key effort will be to minimize transfer time between the fixed route and dial-a-ride services, to make this inconvenience as imperceptible as possible. In a sense, the service level of dual-mode technology will be approximated, using state-of-the-art technology and techniques. It is expected that the transit service model developed in Rochester will be applicable in about 15 similar cities.

On a much smaller scale, a similar project is operational in *Xenia, Ohio*, a city of only 27,000 population that lost a good portion of its transportation system in a tornado in 1974. A fixed route transit service has been established and will be continued with Section 5 assistance. Analyses have been made to determine where there may be opportunities at times of low demand to incorporate demand-responsive service (probably taxicabs) and thereby increase coverage and vehicle productivity. It is expected that the transit service model developed will be of interest to hundreds of small cities similar to Xenia.

In addition to demonstrations, studies related to the transit service objectives are currently underway to examine the potential for new improvements or adjuncts to transit service. The entire field of paratransit has been examined in detail and a popular monograph on the subject is being distributed. Other techniques being analyzed include congestion pricing mechanisms, auto restricted zones, and multi-user vehicle systems.

Increase Productivity

Because the subsidies required to provide high quality transit service have been growing rapidly, methods of reducing costs while still maintaining a high level of service are of significant interest to transit operators, users, and taxpayers. Thus, the achievement of economic efficiency in the operating and scheduling of transit vehicles, as well as raising the occupancy of all passenger carrying vehicles, is an important part of the program objective of increasing transit vehicle productivity.

An early demonstration in this area was the *Washington, D.C.* minibus, which provided low fare downtown circulation service in an attempt to attract high ridership for short trips. The service concept was eventually expanded to include feeder service from in-town employment centers to the downtown commercial district, and is now known as the Washington Downtowner Midibus. The buses operate in this higher density area during the base day at a cost of $12.54 per vehicle hour versus a system average of $18, and generate ridership averaging 9 passengers per vehicle mile, compared to a system average of 3 passengers per vehicle mile. Several cities around the country are adopting similar service to improve their downtown circulation.

Reserved and exclusive lane operations, such as the Shirley Highway and Marin County (Golden Gate) projects, not only increase ridership, and thus productivity, but also increase speed and schedule assurance. This permits the operators to utilize individual vehicles for more runs during a given period than would otherwise be feasible. In *Marin County* an additional 15 trips have been scheduled within the same period of time during the evening peak. It is estimated that an additional 23 buses would be required to operate the *Shirley Highway* service without the exclusive bus lane.

In *Rochester*, as mentioned earlier, dial-a-ride service was substituted for lightly patronized fixed route service in an attempt to increase the efficient utilization of resources. Introduction of computerized routing and scheduling of demand responsive vehicles, together with direct digital communications from the computer to the buses are also expected to improve productivity.

An increase in bus capacity can result in productivity improvements where demand is high. On the *El Monte Busway* in Los Angeles, a demonstration is being sponsored using double-deck buses which seat 84 passengers compared to the conventional 45–50 passenger bus. In *Manhattan*, 64-passenger double-deck buses are to be demonstrated on routes with high passenger demand.

During the sixties a series of experiments was performed in *Boston and Philadelphia* to test rider sensitivity to fare and service changes. It was shown that higher service levels were a stronger influence than fare changes in achieving increased ridership. The Service and Methods Demonstration Program has continued to study this area to further clarify the value of various service and fare changes. In *Amherst, Massachusetts*, a demonstration of free fare transit combined with auto restrictions achieved high ridership and vehicle productivity. Clearly, free fare and prepaid passes encourage ridership while also having the potential to reduce costs associated with fare collection.

Improve Mobility for the Transit Dependent

Providing mobility for those who are unable to afford or use an automobile is central to this objective. This constituency includes the young, old, poor, handicapped and unemployed, and project concepts ought to take into account all such user groups. However, constrained program resources and the intensity of political interest in particular groups combine to confine the focus of this program element at any point in time.

For example, during the period of the civil disorders and rioting in inner city neighborhoods in 1966–67, the limited demonstration resource concentrated on employment facilitation service models, especially service to outlying employment centers. In recent years, the emphasis has been on problems of the aged and handicapped, and legislative expression of such emphasis is common. The most recent is a statement in the Report of the House Appropriations Committee on the 1976 DOT Appropriations Bill. Even after reducing the request for the Service and Methods Program, the Committee directed "that $2,000,000 be earmarked specifically for demonstration projects to provide methods of accommodating the special transportation needs of the handicapped and elderly."

The current emphasis on the elderly and handicapped began in the early 1970's, responsive in particular to Section 16 of the Urban Mass Transportation Act (so-called, Biaggi Amendment, added by PL-91–453 in 1970), which states in part:

> "It is hereby declared to be the national policy that elderly and handicapped persons have the same right as other persons to utilize mass transportation facilities and services; that special efforts shall be made in the planning and design of mass transportation facilities and services so that the availability to elderly and handicapped persons of mass transportation which they can effectively utilize will be assured..."

PERT Dial-a-Bus, Rochester, New York.

Free-Fare Midibus Service for Campus and Community, University of Massachusetts, Amherst, Massachusetts.

Small Bus Used for Transporting the Elderly and Handicapped, TOTE Service, St. Petersburg, Florida.

Wheelchair Lift on Vehicle, Naugatuck Valley, Connecticut.

With respect to the demonstration program, UMTA's efforts were criticized by the House Committee in 1973 with reference to the FY 1974 appropriation as being an assortment of localized projects, not showing promise of developing generalized concepts suitable for widespread adoption. Responsive to this criticism, new starts were curtailed and $1.4 million of the FY 1974 apportionment for this part of the program was used to finance a major research project. Now underway, and scheduled for completion in the latter half of FY 1976, it is a market research effort with respect to the transportation needs of the elderly and handicapped, which will address the issue of full accessibility of mass transportation systems versus specially designed services, and suggest services mixes and concepts (in fact, design typical demonstrations).

Following the organization of the research project, the caseload of existing projects was reviewed to try to identify concepts which showed promise of evolving as service models for cities of different sizes. The result was the identification of one very promising service model and a more focused program of experimentation, which dovetails with the research.

A range of demand-responsive services for the elderly and handicapped has been sponsored in recent years. The currently active caseload includes projects in Cranston, Rhode Island; St. Petersburg, Florida; Naugatuck Valley, Connecticut; Baton Rouge, Louisiana; and Cleveland, Ohio. These services are often coordinated with social service agencies and have frequently used specially modified equipment. All use small vehicles and require pre-registration to establish eligibility for use of the system.

Small City Model. In the *Naugatuck Valley, Conn.*, a transit service model has been developed that provides both subscription and dial-a-ride service and features a credit card system which permits monthly billing either to the riders or to the 20 social service agencies which use the system for client transportation. The equipment is activated by the credit card, records time, trip distance and other information permitting computerized billing, analyses of trip-making, vehicle usage, etc. The rider may be billed for a portion of the trip charge, with the supporting agency paying the remainder. The system covers a large service area (54 sq. mi., four towns, pop. 75,000) with a low density of eligible riders (119 per sq. mi.). It provides its approximately 3,200 registered users with almost 12,000 trips per month, achieving heavy use in a low density region by extensive reliance upon service to geographically concentrated destinations. Currently saturated, the system will soon receive additional vehicles to expand service. This service model, it is felt, has potential application in literally several hundred urban places.

Medium-Size City Model. The Naugatuck model, through close integration with the regular transit system and refinement of the fare collection system, has potential application in much larger places. To test such application, two projects were approved in FY 1975 in *Portland, Oregon*, and *Albuquerque, New Mexico*, cities with populations of approximately 400,000. These projects also require coordination with existing special transportation services offered by social agencies and with taxi service. If adaptation of the Naugatuck model is successful in these circumstances, there are approximately 40 cities in the 200,000–500,000 population range which seem to be potential sites for its use.

Large-City Model. To investigate the potential for the Naugatuck type service in the largest urban areas, such as *Chicago*, a planning phase was funded in FY 1975 to develop a detailed implementation plan for a pilot demonstration. The problem will be to reduce the multiple and fragmented transportation efforts provided by a large number and variety of agencies serving the elderly and handicapped, and to establish a centralized provision of transportation services for the various health and social service agencies. The planning phase will contain an inventory and

analysis of data required to determine the travel needs of the mobility limited and the most effective approach to meeting those needs in one geographic sector of Chicago of about 500,000 to 750,000 population. The study will define the specific boundaries of the sector to be served in the demonstration phase, and will also develop plans, specifications, procedures and criteria for operating the special transportation service.

Support Activities

Numerous other activities designed to develop innovative techniques for improving urban mobility are being carried out within the Service and Methods Demonstration Program. The study related to travel requirements of various classifications of handicapped people and the aged was mentioned earlier. In another effort transit operations in a number of small communities are being studied in order to assemble a document and conduct a series of regional workshops which will point the way toward principles to be considered in implementing such systems in non-urbanized areas.

A study is underway to investigate the interaction between moving goods and moving people in urban areas and propose specific demonstrations which will lower the costs and increase the efficiency of urban goods movement. A state-of-the-art survey of park-and-ride systems has been made. This survey revealed a substantial amount of planning knowledge and guidelines that will be compiled for use by transportation planners.

Experts in attitudinal research and behavior prediction, both within and outside of the transportation specialty, were brought together for a conference on the application of these techniques to transportation planning, operations and evaluation. It was the consensus of this group that the investigation of alternative study approaches and the validation of attitudinal predictive and evaluative techniques had not been attempted in a structured fashion in the transportation field. Consequently, work is underway to define appropriate techniques to be applied in an experimental demonstration.

Additional techniques to assist in the planning and evaluation of demonstrations are being developed. These techniques include sketch planning methods, improved modal choice models based upon demonstration results, and improved survey and data collection techniques. Significant emphasis has been placed upon the development of a consistent framework for the evaluation of various demonstrations so as to permit cross comparison and enhance transferability of results. A set of evaluation design guidelines have been completed and will become the program standard for all demonstrations.

Finally, in support of the overall effort to disseminate information about program results through publication of reports documenting specific projects, program activities have been reported extensively in the professional literature, and a more formal mechanism to insure the accessibility and broad distribution of information is being created. Workshops were held in San Francisco and Miami in which the results of bus priority demonstrations were reviewed and the knowledge obtained was shared. Attendance included representatives of the transit and traffic operations fields, as well as various levels of government. A document developed as part of the workshops will provide technical guidelines for areas planning priority treatments for high occupancy vehicles. Continued use of this method of reaching users of Service and Methods Demonstration information is anticipated.

Many promising transit service concepts are being developed and demonstrated within the Service and Methods Program. Each demonstration is a specific, carefully structured application of a generalized concept or service model using techniques which support one or more of the program objectives. The emphasis on systematic evaluation and dissemination of the results of these projects should facilitate the transferability of the concepts to other urban areas. Hence, the long range impacts of the program will be to encourage widespread adoption of established techniques for improving the quality and quantity of public transportation.

PLANS FOR FISCAL YEAR 1976

In the following pages, the FY 1976 plans are described with reference to each of the demonstration categories, exemplary and experimental, and by objectives under each category. The Congressional Submission sought $9.25 million for the program, but it appears that the appropriation level will be less. Within the $9.25 million level, $5.3 million was intended for 10 exemplary demonstrations; $4.95 million for 10 experimental projects. The discussion assumes $9.25 million, but a moderately lower level would not affect the substance of the program.

EXEMPLARY DEMONSTRATION CATEGORY

A number of promising innovations responsive to the program objectives have been evaluated under experimental demonstration projects. While there is a relatively limited budget in FY 76 with which to foster further adoption of these promising innovations, it is anticipated that we will join with a few places on a highly selective basis. Often the moral and technical support provided by the Service and Methods Demonstration Program is at least as important as the relatively modest financial resources available to assist the adoption of innovations.

Reduce Trip Time and Increase Area Coverage

A major effort is being made to gain greater participation in the improvement of public transportation from the *taxicab industry* which is still largely privately held. There is a substantial resource available in this industry to provide public transportation. However, it must increase its capacity to move people by innovating in the direction of shared-ride service as opposed to its traditional exclusive ride service; then it must be effectively engaged by the public sector. The problems appear to differ between the smaller urban areas (under 250,000 population) where there are often smaller taxi companies, and the larger urban areas where larger, more complex company operations may be involved along with publicly operated transit systems which cause more difficult system integration problems. However, the basic concept of integrating demand-responsive service with fixed-route service is very promising in both environments. The possible alternative methods for accomplishing the integration need to be better defined and given exposure.

Consequently, two projects in relatively small urban areas (under 250,000 population), and two projects in larger urban areas (over 1,000,000 population) are now being planned for support in fiscal year 76. Because the problems of integration are expected to be less complex in the small urban areas, conventional dispatching techniques will be used. In the larger areas, assistance will be obtained from our Office of Research and Development in the application of computerized dispatching to achieve the integrated demand-responsive and fixed-route service. This latter approach was used in developing the Rochester project in fiscal 75. The major

differences in the projects planned for fiscal 76 are the use of taxicab companies and the type of trip patterns served. The fiscal 76 projects will involve more widely dispersed trip patterns.

Another significant project worthy of special note under this objective was funded in fiscal 75 and will become operational in fiscal 76 in *Houston, Texas*. It involves the application in four travel corridors of various proven traffic management techniques developed in earlier experimental demonstration projects. All UMTA program resources are being combined in this imaginative project to reverse the auto dominated trend in Houston. Local leaders in Houston recognize continued active expansion of the downtown business center will be greatly constrained by the capacity of the auto dominated approach. Consequently, they are working aggressively with us to develop effective low cost alternatives. Participation by the taxicab industry has been under active consideration as part of the project. It is expected that some form of integrated operation will be added later in the project although no funds are presently available for this in the fiscal 76 budget.

Increase Vehicle Productivity and Increase Area Coverage

Very closely allied with the travel time objective is the effort to raise vehicle productivities through *subscription arrangements*. In doing so, the service area or outreach of public transportation may be expanded at a minimal cost.

Public pressures are increasing for more transit service in return for local tax support. Cost effective approaches to providing the increased service coverage are needed to reduce or eliminate the associated increased cost and thus the tax burden these demands generate.

In areas where commuter trips cannot be served conveniently or economically by conventional fixed-route transit, subscription service may be utilized to increase vehicle occupancies and decrease the number of single occupant autos. Subscription service may be provided by taxi operators, bus operators, and vans driven by commuters either through ad-hoc or publicly organized efforts. Two projects in FY 76 will seek to demonstrate that all of these alternatives should be considered as part of an urban area's transportation system, and should be organized and administered by the area transportation provider. However, it is difficult to find organizations that are this flexible. One of these projects funded in the fiscal 75 budget will become operational in *Knoxville, Tennessee* in about eight months. It is estimated that several hundred urban areas are candidates for this type of innovative transit service model.

Improve Mobility for Transit Dependent

The Naugatuck Valley Demonstration Project discussed under Demonstration Accomplishments has provided a promising transit service model. Two projects were supported with the fiscal 75 resource and will transfer this innovation to Portland, Oregon, and Albuquerque, New Mexico. Because of the limited resource in fiscal 76 only one additional medium-sized (200,000 to 500,000 population) urban area will be financially encouraged to adopt this promising innovative method for serving the special needs of the elderly and handicapped.

With reference to the largest urban areas, it was reported under the Demonstration Accomplishments discussion that UMTA recently approved fiscal 75 funding for a study project leading to a demonstration design and possible funding for implementation in a sector of Chicago in fiscal 76. A similar type study is under review for possible funding in fiscal 76 in New York City.

EXPERIMENTAL DEMONSTRATION CATEGORY

Expansion of the knowledge base is essential for the advancement of any endeavor. These advancements may come in rather small increments in relatively low risk projects of the type just described whose major purpose is to gain widespread adoption of promising ideas. However, to make substantial gains in our knowledge of promising ideas requires bolder and consequently higher risk projects. These projects are generally more limited in scope with more tightly controlled evaluations.

Reduce Trip Time, Increase Coverage and Improve Reliability

Perhaps the most difficult operating environment for transit is in the *congested downtown* area. One demonstration project is planned in fiscal 76 to address this problem. Two research studies funded in fiscal 75 will develop site specific demonstration designs for two additional approaches — auto-restricted zones and congestion pricing.

The fiscal 76 demonstration project will be less complex than either of the concepts in the two research studies, although it will be a valuable step toward accomplishing the more complex projects. Under this demonstration, one or more streets will be designated for exclusive use by surface transit to expedite these operations in the downtown area. Also included with the transit only street(s) will be more routine aids such as specially timed traffic signals or total pre-emption of the signals by transit, bus turnouts, etc.

The more comprehensive approaches that will be under study in fiscal 76 will discourage vehicular traffic over a wider portion of the downtown area thus creating a more attractive overall environment for pedestrians. *The auto-restricted zone concept* is a regulatory approach where all thru-traffic to the downtown area except transit would be prohibited either permanently or at certain times of the day. Most cities in Europe that have applied the concept allow vehicular traffic to penetrate sectors of the downtown and it is expected that to achieve political acceptance in this country one would have to be at least this lenient. The *congestion pricing concept* is, as the term implies, a pricing as opposed to regulatory approach for limiting vehicular traffic in the congested area of downtown. Special licenses or windshield stickers would be required for all vehicles, except those providing public transportation, wishing to travel into or through this "priced" area of the downtown. Again, it may be applied either at peak times or on a permanent basis. One foreign city (Singapore) has just implemented the concept and London has seriously considered it. It has been under discussion for over 20 years in this country. However, the Service and Methods Demonstration Program effort is now the closest anyone has come to an actual implementation. Because of the comprehensive nature of both concepts, it is expected a full complement of UMTA resources would be needed to make implementation feasible.

Another demonstration project planned for fiscal 76 involves *applying traffic management techniques to a broader spectrum of public transportation modes.* In other words, it would complement efforts to develop para-transit services such as carpools, subscription vans and buses and shared-ride taxis, by employing traffic management techniques (reserved and contra-flow lanes, etc.) to expedite their flow in congested areas. The obvious problem this mixed use raises is the possible delay caused by differing vehicle performance, especially loading and unloading of passengers. Consequently, well documented information on the actual results of these interactions will be useful guidance in determining the appropriate application for these traffic management techniques in aiding all forms of surface public transportation.

A final project planned in fiscal 76 under these objectives would explore methods to develop currently under-utilized *water rights-of-way for transit*. It involves the use of relatively small (approximately 50 passengers) high-speed boats to provide trip times comparable to the automobile. Although it is not envisioned that waterborne transit service will become a major transit mode, preliminary studies indicate that there are a significant number of potential water rights-of-way in urban areas that might be developed to serve this market for transportation services. The demonstration would determine passenger acceptance of the high-speed boats, responsiveness of demand for the service at various levels, suitability of existing craft, potential markets for the service, and alternate services to attract off-peak use.

Improve Transit Vehicle Productivity

Closely related to this objective, which is generally thought of in terms of the number of passengers being moved a certain distance per unit of time, is also the basic cost of the particular vehicle operation. Efforts to reduce travel time may also work to increase passenger volumes and increase the number of trips that can be made by a driver and vehicle. These related efforts won't be repeated under this objective. Instead, efforts to shift demands to appropriate lower cost para-transit modes and to off-peak marginal cost operations are included under this objective.

In regard to the latter, one obvious strategy involves *the application of pricing*. Just as one is encouraged to use the telephone after business hours by reduced toll rates, people might be encouraged to use transit in the off-peak with lower rates. It has even been suggested by some that transit should be free in the off-peak, while others would completely eliminate the pricing mechanism and make transit free at all times. These issues have been under investigation in FY 75 using data from locally sponsored fare changes and will continue under study in fiscal 76 including development of a program of carefully designed experimental demonstrations to fill in data gaps. Of course, the price is just part of the input to the consumer decision, and the service being offered rounds out that decision. The relative weight given to each of these by various consumer groups is important to know in order to properly allocate limited resources being used to influence these decisions. Unfortunately, there is considerable debate and little hard facts regarding the price and service trade-offs. Several *price and service variation* demonstration designs will be developed in fiscal 76 for possible implementation in FY 77.

Ultimately, the price and service variation demonstration would consist of performing timely changes to transit fares and selective levels of service. It would measure the relative importance of each of these key elements as reflected by the actual transit rider reaction. The experiment would identify the price and service levels that caused significant increases in transit ridership, especially noting increases from previous automobile users. Also, upper service levels that did not cause any further increases in ridership or productivity would be identified. An overall evaluation would be made of the effect of these price and service changes in increasing mobility for the various sectors of the transportation market. Social-welfare implications would be defined.

To be more specific, price and service variations that would be considered involve the fare, wait and ride time, vehicle fleet, door-to-door accessibility, and comfort and convenience factors. Isolated and incremental reductions in fare would be used to obtain demand elasticities for different fare levels. Improvements in travel time and frequency of service would involve such things as increasing the number of vehicles and skip-stop or express service during the selective hours. Door-to-door accessibility might be improved by advance reservation and route deviation service, establishing a network of bus routes with timed transfer points at strategic locations in residential areas, and park-and-ride or demand-responsive feeder service to the line haul transit.

Comfort and convenience could be improved by introducing vehicles that are aesthetically attractive, clean, temperature controlled and more spacious with better seat design.

Related to the pricing strategy is the approach to *presenting the price to the consumer.* A study begun in fiscal 76 will analyze the various approaches used over the years for pre-paying for transit service. Consumer reaction to these various techniques, effect on system revenue, and administrative costs and problems are not presently very well documented. It is possible that it will be desirable to try new combinations of *pre-payment systems* and administrative techniques like the use of payroll deduction. Possibilities for site specific demonstrations will be analyzed and the funding of one operational project is planned in fiscal 76.

Finally, a small research study is planned to look into the feasibility of licensing private automobile operators to carry passengers on commuter trips only. The concept is termed "*Shared-Ride Auto*" and would provide service between well defined origins and destinations. Organized properly, it could reduce peak load burdens for the transit operator and provide users with more flexibility in their travel than is possible under more conventional carpooling. Consequently, the vehicle productivity of the auto system is raised and the cost burdens of peak operations for transit operators is reduced.

Improve Mobility for Transit Dependent

Examination of and preliminary experimentation with *user-side subsidies* will continue into fiscal 76. In fiscal 76, one demonstration project in Danville, Illinois, will become operational with funding having been provided in fiscal 75. Two additional projects are planned for funding in fiscal 76.

In this concept, selected groups of current or potential transit users (young, handicapped, elderly) are provided tokens or transportation vouchers at less than face value. The transportation provider (i.e., private taxi or bus operator) redeems them at full cash value, or even at a premium, from the agency administering the program. The objective is to improve trip opportunities for specific user groups by encouraging the development of services such as shared-ride taxi service at reduced rates. The project funded in fiscal 75 is in a relatively small community (approximately 40,000) and will involve shared taxi operations. One more similar experiment will be supported in fiscal 76, plus a more complex operating project involving both taxi and bus operations. With reasonable success, it may be possible with this concept to reduce the impetus toward the institutionalization of public providers to meet the mobility needs of the transit dependent. This concept also has special potential with respect to possible use by clients of HEW programs, using HEW funds to subsidize certain trips — e.g., travel to meal centers under the nutrition support program.

Another method that appears very promising in reducing the cost of providing special transportation for the elderly and handicapped, but at the same time increasing their mobility is the *community broker concept.* One project was approved in fiscal 75 to be demonstrated in a small sector of Santa Clara County, California, and one more project is planned in fiscal 76.

The community broker demonstration will identify individuals who will serve as transportation brokers for specific target groups desiring transportation services. The broker will be the middle man between these clients and the transportation providers. By grouping riders, the broker would attempt to work out arrangements with providers for reduced rates for groups travelling to shopping, health and recreational activities at times arranged in advance. He/She might also

arrange group discounts (even no-fare service) for shopping, etc. The broker could work as an employee of a transportation provider, or an organization serving the target group; or could work independently and obtain a commission from clients (perhaps as a supplement to a retirement income). In the community brokerage system, the broker is not a supplier or subsidizer of services.

Finally, the *mobility problems of inner city residents* will be analyzed in a study now planned for funding in fiscal 76. Various promising approaches are expected to be identified in the research study and site specific demonstration designs will be developed. One demonstration is planned in fiscal 76. *Jitney-type service*, where sedans or vans operate random but frequent service between inner city points, exists in a few cities on an ad-hoc basis outside the local institutional or regulatory framework. This service has attractive and important mobility value to the residents of these areas not being met by the traditional fixed-route transit operation. It is anticipated the concept of jitney service with an organized licensing arrangement to protect users, but with relatively open entry, should add an important demand-responsive dimension for inner city public transportation at low cost.

RELATIONSHIP TO TRANSPORTATION SYSTEM MANAGEMENT (TSM)

A vital part of the Transportation Improvement Program regulations recently issued by UMTA and FHWA is the Transportation System Management (TSM) element. The regulations call for urbanized areas to formulate an overall policy strategy, assess candidate measures, and select, program and *implement actions* to improve the efficiency of the existing urban transportation network. The results of previous Service and Methods Demonstration (SMD) projects such as the Shirley Highway and I-35W Metered Freeway projects described herein are valuable sources of information on the types of innovative actions that can be taken. Future demonstration projects will expand the knowledge base of innovative measures that relate to TSM.

The materials currently being compiled by UMTA and FHWA to assist local areas to plan TSM actions include a large amount of information from SMD projects. As stated previously, the SMD program technically assisted in putting on two workshops in 1975, in San Francisco and Miami, in which a state-of-the-art document was critiqued and modified for immediate use in the TSM effort. In addition, to further assist local areas to identify and implement these actions, the SMD program is embarking on an effort to develop a set of documents based on information available from innovative projects. Each document in the set will be geared to a specific level of local interest ranging from the low level professional staff person charged with implementing the specific projects to the high level decision maker setting policy on the actions to adopt.

Future exemplary demonstration projects will encourage the adoption of the additional innovative actions that local decision makers continue to show hesitation to include in the TSM element. Also, experimental projects will explore new innovations such as congestion pricing and auto-free zones in further developing the assortment of vanguard practices that may ultimately be adopted through the TSM element.

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